ACS Chemistry for Life™

Starting Salaries of Chemists And Chemical Engineers: 2012

Analysis of the American Chemical Society's Survey Of Graduates in Chemistry and Chemical Engineering

Steve and Clint Marchant
Data Based Insights, Inc. on behalf of the
ACS Department of Member Research & Technology

May 15, 2013

American Chemical Society

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1115 Sixteenth Street, NW
Washington, DC 20036
800.227.5558

Available from the Department of Research and Member Insights

ACKNOWLEDGEMENTS

For more than three decades, the American Chemical Society has prepared an annual survey of new graduates. This year, under the direction of the ACS Committee on Economic and Professional Affairs' Subcommittee on Surveys, the ACS conducted a survey to determine trends in starting salaries and the employment status of chemists and chemical engineers. This report presents the detailed results of the 2012 survey of new graduates.

The survey was conducted and managed by Gareth Edwards, Senior Research Associate in the ACS's Department of Research and Member Insights. Andrew Bell of Intelliscan, Inc. directed the data collection. Steve and Clint Marchant of Data Based Insights, Inc. (an affiliate of Intelliscan) analyzed the results of the survey and prepared this report.

Gareth Edwards
Senior Research Associate
Department of Research and Member Insights

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SUMMARY AND COMMENTS

The *Starting Salaries of Chemists and Chemical Engineers: 2012* report examines new graduates as of May-June 2012 and documents the starting salaries for those who obtained a full-time job by October 1, 2012. The report discusses median and mean starting salaries, and summarizes how salaries have changed over time. It presents current findings on salary ranges, employment sectors, and salaries between genders. It assesses the proportion of graduates that are going on to advanced studies. It covers employment status, unemployment and job satisfaction.

- Median 2012 starting salaries for *inexperienced* graduates was $40,000 for bachelor's, $48,000 for master's and $80,000 for Ph.D. degree recipients (Table 1a).
- *Chemistry graduates with Ph.Ds.* and less than a year of professional work experience received a median starting salary of $74,500, which is 2.0% lower than the starting median in 2011 (Table 1b).
- Salaries for *chemical engineers with bachelor's degrees* with less than a year of professional work experience had a healthy median salary increase in 2012 of 6.8% to $66,750 in current dollars. They had a net increase of 4.6% in constant dollars (Table 1c).
- Combining data over the past 5 years (2008-2012) to get a robust sample reveals that during this period the government was the highest payer of full-time starting median salaries for *chemistry graduates* ($42,000 – Table 5b). However, in 2012 there was an 8.9% cutback reflecting government's effort to reduce expenditures.
- The government is well behind industry and academia in the median salaries it pays for new chemical engineering graduates.
- The gap in salaries between men and women is getting smaller. The median salaries for female chemistry and chemical engineering graduates were 5% and 2% lower, respectively, in 2012 than those for men (Table 7).
- The combined 2008-2012 data for chemical engineers indicates that women received a starting median wage 1.5% higher than the median for their male counterparts (Figure 3b, p.16).
- Approximately 44% of chemistry and 15% of chemical engineering B.S./B.A. and M.S. graduates combined have enrolled in continuing education programs either full or part-time in fall 2012 (Table 8).
- Unemployment rates among new grads are slightly lower in 2012 (12.6%) than in 2011 (13.3%). The U.S. economy is slowly improving, which may make 2011 the peak rate for new graduate unemployment in the near term (Figures 4 & 5, pp. 19 & 20).

STARTING SALARIES

MEDIAN STARTING SALARIES

Median Salaries for all New Graduates: *Full-time* starting salaries for *inexperienced* new graduates overall (i.e., bachelor's, master's and doctorate degree new graduates with less than 12 months of professional or technical work experience) received a median salary of $41,600 in 2012. The figure is 2.1% lower than the median of $42,500 new graduates received in 2011 in current dollars.

Table 1a. Median Full-Time Starting Salaries for **Inexperienced** New Graduates
(Chemistry & Chemical Engineering Graduates Combined 2011-2012)

	Median Salary in Current Dollars		% Change from 2011	
	2011	2012	Current Dollars	Constant Dollars*
All New Grads	42,500	41,600	-2.1%	-4.3%
Bachelor's	40,000	40,000	0.0%	-2.2%
Master's	n.a.	48,000	n.a.	n.a.
Doctorate	85,000	80,000	-5.9%	-8.1%

* Rate of inflation = 2.2%
Cells with fewer than 15 cases not available and indicated with "n.a."

As shown in **Table 1a**, net changes from 2011 to 2012 for all new grads include the following:

- The median salary for *inexperienced bachelor's degree* recipients was the same in 2012 as in 2011, both at $40,000. However, after deducting 2.2% for inflation, a 2012 salary of $40,000 would have a loss of almost a thousand dollars in buying power.
- The 2012 median salary for recipients of *master's degrees* was $48,000 in 2012. The corresponding sample for 2011 is not shown because it is too small to be considered reliable.
- The median salary for *PhD* recipients with less than 12-months work experience dropped $5,000 or -5.9% from $85,000 in 2011 to $80,000 in 2012 current dollars. In constant dollars the loss expands to -8.1%.

Constant dollar calculations are based on the change in the Consumer Price Index (CPI) from October 2011 to October 2012, which registered an increase in prices of 2.2% over the one year period. The CPI measures the change in the price of a constant basket of consumer goods and services over time. The increase is a measure of inflation.

Median Salaries for Chemistry Graduates: Median salaries for all chemistry graduates combined (that is, bachelor's, master's and Ph.Ds.) remain relatively constant from 2011 to 2012. The overall median salary for graduates with less than 12 months of technical work experience in 2011 is $38,500, up +1.3% to $39,000, a change of $500 in 2012.

Table 1b. Median Full-Time Starting Salaries for **Inexperienced Chemistry** Graduates (2011-2012)

	Median Salary in Current Dollars		% Change from 2011	
	2011	2012	Current Dollars	Constant Dollars*
All Chemists	38,500	39,000	+1.3%	-0.9%
Bachelor's	35,000	36,000	+2.9%	+0.7%
Master's	n.a.	46,500	n.a.	n.a.
Doctorate	75,980	74,500	-2.0%	-4.2%

* Rate of inflation = 2.2%
Cells with fewer than 15 cases not available and indicated with "n.a."

Table 1b reviews comparison salaries for new graduates in chemistry between 2011 and 2012:

- Median salaries for new grads with *bachelor's* degrees rose 2.9% from $35,000 in 2011 to $36,000 in 2012 in current dollars. After discounting 2.2% for inflation, $36,000 is worth $35,208 in 2011 buying power.
- The current dollar median for *master's* degree recipients in 2012 is $46,500.
- The starting median salary for *PhD* degree recipients in 2011 was $75,980. In 2012 it dropped -2.0% to $74,500.

Note: Salary data is based on new graduates as of May-June 2011 or 2012 who had obtained full-time permanent employment by the first week of October the same year.

Median Salaries for Inexperienced Chemical Engineering Graduates: For recipients of bachelor's, master's and doctorate degrees combined in 2011, the median starting salary was $65,000. A 3.1% increase in 2012 brought the median to $67,000. In constant dollars, the 2012 increase in salary is worth +0.9%.

Table 1c below shows the net changes by degree:

- Chemical engineers receiving *Bachelor's* degrees in 2012 received a sizeable increase in their median salary of $4,250 or +6.8% in current dollars. However, in real 2011 dollar buying power the net increase is reduced to $2,875 or +4.6%.
- Salary sample sizes for new grads with *Master's degrees* and *Ph.Ds.* are not shown because they are too small to be reliable.

Table 1c. Median Full-Time Salaries for **Inexperienced Chemical Engineers** 2011-2012

	Median Salary in Current Dollars		% Change from 2011	
	2011	2012	Current Dollars	Constant Dollars*
All Chem. Engrs.	65,000	$67,000	+3.1%	+0.9%
Bachelor's	62,500	66,750	+6.8%	+4.6%

* Rate of inflation = 2.2%

MEAN STARTING SALARIES

Mean Starting Salaries for all New Grads: The average (mean) full-time starting salaries for all *inexperienced* new graduates – that is, chemistry and chemical engineering graduates combined -- are about the same in 2012 as they were in 2011.

Note: Mean salaries tend to be higher than corresponding median salaries, because several graduates including chemical engineers – a smaller group overall -- are able to command significantly higher salaries, which skews the corresponding means higher.

Table 2a. Mean Full-Time Starting Salaries for **Inexperienced** New Graduates
(Chemistry & Chemical Engineering Graduates Combined 2011-2012)

	Mean Salary in Current Dollars		% Change from 2011	
	2011	2012	Current Dollars	Constant Dollars*
All New Grads	48,890	47,883	-2.1%	-4.3%
Bachelor's	43,368	43,801	+1.0%	-1.2%
Master's	n.a.	51,154	n.a.	n.a.
Doctorate	78,653	75,484	-4.0%	-6.2%

* Rate of inflation = 2.2%
Cells with fewer than 15 cases not available and indicated with "n.a."

- As shown in **Table 2a,** the mean starting salary for *all new grads* in 2012 was $47,883. That is 2.1% lower than the mean for all new grads in 2011 of $48,890.
- The mean starting salary for new grads receiving *bachelor's* degrees in 2012 is $43,801. This is a modest 1.0% higher than the mean for bachelor's degree students in 2011 of $43,368.
- The mean salary for new grads with a *master's* degree is $51,154 in 2012.
- The mean for new grads with a *doctoral degree* is lower in 2012 by -4.0%. In constant dollars, the combined loss of purchasing power across the one year period is -6.2%.

Means for Inexperienced Chemistry Graduates: The mean salary for chemistry graduates with less than 12 months of professional experience by October 2012 was $42,580 for all 3 degrees combined. This current dollar figure is 0.6% lower than the overall mean for chemistry graduates last year of $42,854. In buying power, the constant dollar value of the 2011 mean in 2012 is $41,654 or a net loss of -2.8% for 2012 graduates.

Table 2b. Mean Full-Time Starting Salaries for **Inexperienced Chemistry** Grads (2011-2012)

	Mean Salary in Current Dollars		% Change from 2011	
	2011	2012	Current Dollars	Constant Dollars*
All Chemists	42,854	42,580	-0.6%	-2.8%
Bachelor's	37,047	37,210	+0.4%	-1.8%
Master's	n.a.	50,351	n.a.	n.a.
Doctorate	71,964	72,574	+0.8%	-1.4%

* Rate of inflation = 2.2%
Cells with fewer than 15 cases not available and indicated with "n.a."

Referring to **Table 2b** above, the net changes by degree were:

- *Bachelor's* received a net increase of +0.4% in current dollars and a net loss of -1.8% in constant dollars.
- There was not enough data to make a meaningful analysis of *inexperienced Master's degree* graduates.
- *Ph.D.* new graduates received a modest increase of +0.8% in current dollars, but a net loss of -1.4% in constant dollars.

Means for Inexperienced Chemical Engineers: Chemical engineering new graduates in the professional or technical workforce for less than 12 months received a mean salary of $67,845 in 2012. This was a +1.4% increase over the mean salary of $66,923 for new grads in 2011. However, in real dollars the mean salary for new chemical engineering graduates was slightly lower in 2012 by -0.8%.

Table 2c. Mean Full-Time Salaries for **Inexperienced Chemical Engineers** (2011-2012)

	Mean Salary in Current Dollars		% Change from 2011	
	2011	2012	Current Dollars	Constant Dollars*
All Chem. Engrs.	66,923	$67,845	+1.4%	-0.8%
Bachelor's	61,416	65,530	+6.7%	+4.5%

* Rate of inflation = 2.2%
Cells with fewer than 15 cases not available and indicated with "n.a."

Table 2c below shows the net changes by degree:

- Chemical engineers receiving *Bachelor's* degrees in 2012 received a net increase of $4,115 or +6.7% in current dollars. In real dollar buying power compared to the 2011 mean, their net increase was whittled down to $2,764 or +4.5%.
- Sample sizes for *Master's degree* and *PhD* recipients are too small to be reliable and are not shown.

SALARY INCREASES OVER TIME

Table 3 shows annual median starting salaries for *inexperienced* chemists and chemical engineers salaries from 1985 through 2012.

Table 3. Median Starting Salaries for **Inexperienced** Graduates by Degree 1985-2012 ($000)

	Chemists			Chemical Engineers		
Year	B.A./B.S.	M.S.	Ph.D.	B.A./B.S.	M.S.	Ph.D.
1985	19.5	27.0	35.9	28.0	31.4	40.0
1986	18.6	26.1	38.0	28.4	31.0	41.5
1987	20.0	28.0	38.4	30.0	32.5	43.0
1988	21.9	27.7	40.5	31.0	33.0	44.4
1989	23.0	30.3	42.0	33.0	36.0	47.0
1990	23.0	30.0	44.0	35.2	37.2	50.0
1991	23.0	32.0	46.0	37.5	40.2	52.0
1992	24.0	31.5	47.5	40.0	41.5	54.0
1993	24.0	34.0	50.4	40.5	42.2	52.7
1994	24.0	30.8	48.0	n.a.	n.a.	n.a.
1995	25.0	36.0	50.0	40.0	44.2	59.2
1996	25.0	34.1	45.0	41.5	45.0	57.0
1997	28.0	37.5	54.0	42.0	47.0	60.0
1998	29.5	38.5	59.3	45.0	49.8	65.0
1999	30.0	42.0	61.0	47.0	52.0	67.7
2000	34.3	44.1	64.5	49.4	55.0	72.0
2001	32.2	43.0	69.5	51.0	60.0	73.5
2002	31.0	45.0	67.0	50.0	59.0	75.0
2003	32.0	44.5	63.3	52.0	55.0	72.0
2004	32.6	43.3	65.0	52.0	59.3	78.6
2005	35.0	45.0	72.0	54.0	62.2	83.0
2006	35.0	47.4	60.0	55.8	58.0	78.0
2007	37.0	48.0	75.0	58.0	65.5	84.5
2008	35.0	49.8	75.0	63.0	60.0	85.0
2009	33.6	48.5	73.1	66.0	60.0	86.8
2010	35.0	45.1	72.0	64.0	n.a.	93.5
2011	35.0	46.7	76.0	62.5	n.a.	100.0
2012	36.0	46.5	74.5	66.8	75.2	93.0

As indicated in Table 3, over the 27 year period, starting salaries have almost doubled for chemists and more than doubled for chemical engineers. For example, the starting median salary for *inexperienced chemists* working full-time in permanent positions with a bachelor's degree in 1985 was $19,500. In 2012, a B.S. graduate with the same credentials would receive a median wage of $36,000.

The gaps between starting levels for each of the 3 *chemistry* degrees have also changed:

- The starting median for an M.S. degree in chemistry in 1985 was $27,000 or 39% more than the bachelor's degree median of $19,500. The starting median for a Ph.D. in chemistry was $35,900 or 33% higher than the M.S. degree.
- Fast forward to 2012 and the starting median for an M.S. degree in chemistry is $46,500 or only 29% more than the $36,000 median for bachelors (a smaller gap of 10 percentage points). However, the starting median for a chemist Ph.D. is $74,500, which is 60% higher than the median for the M.S. degree (and 107% higher than the bachelor's starting wage).
- The highest starting median salary for *chemists* with a bachelor's degree was $37,000 in 2007, $49,800 for a master's degree in 2009, and $76,000 for a Ph.D. in 2011.

Chemical engineers start with higher salaries but the gaps between degrees is not quite so big.

- In 1985 the starting median for an M.S. degree in chemical engineering was $31,400, which was just 12% higher than the starting median for bachelors of $28,000. The Ph.D.'s starting median was $40,000 or 27% higher than the M.S. median.
- Jumping to 2012, the starting median for chemical engineers with a M.S. degree is $75,200, which is still just 12% higher than the starting bachelor's median salary of $66,800. Finally, the Ph.D.'s starting median of $93,000 is just 24% higher than the M.S. median.
- The highest starting median salary for *chemical engineers* was $66,800 for bachelor's degrees in 2012, $75,200 for master's degrees in 2012, and $100,000 for Ph.D.'s in 2011 (see Table 3 for details).

Figures 1a & 1b depict salary trends for chemists and chemical engineers by using the data in Table 3 as plot points.

Figure 1a: Median Starting Salaries for **Inexperienced Chemists** Working **Full-Time,** 1985-2012 in Current Dollars

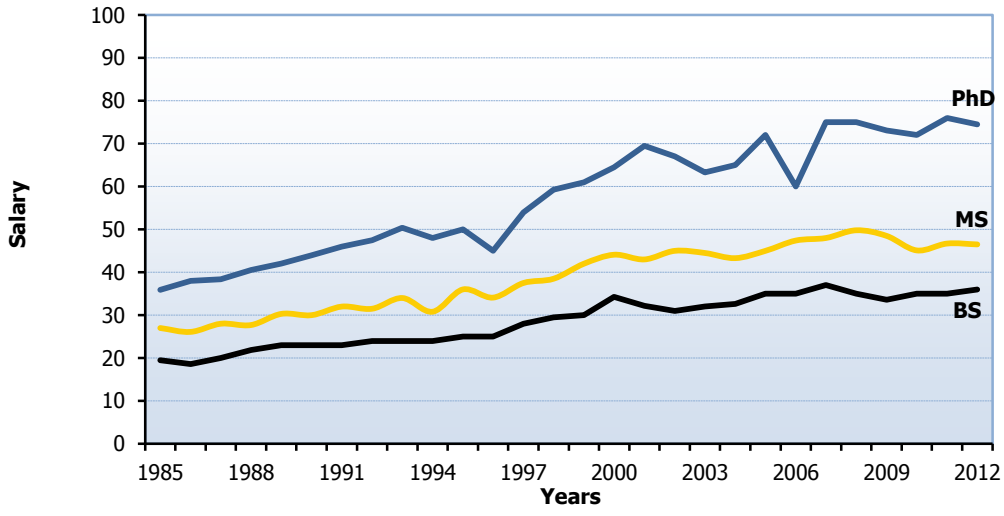
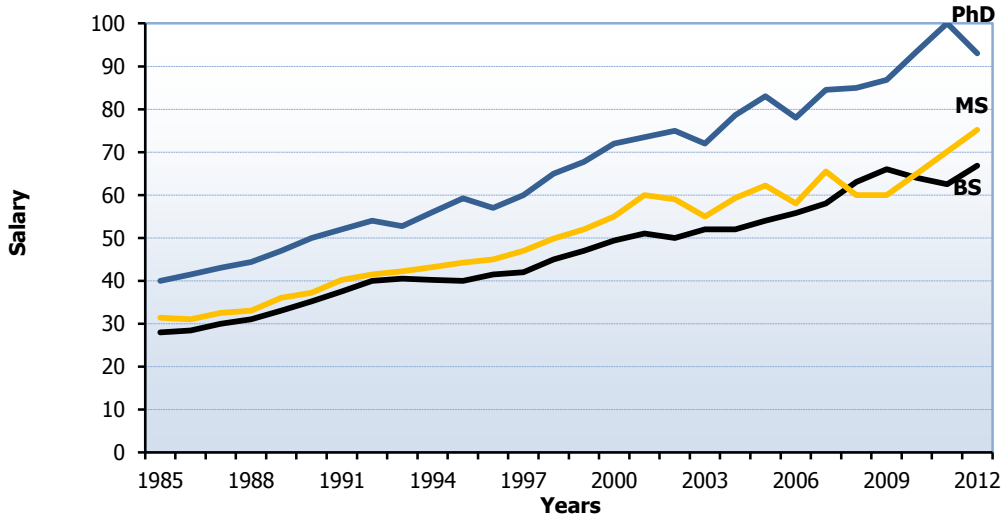


Figure 1b: Median Starting Salaries for **Inexperienced Chemical Engineers** Working **Full-Time,** 1985-2012 in Current Dollars



STARTING SALARIES BY PERCENTILE

Tables 4a and 4b breakout starting salary ranges for inexperienced full-time permanently employed chemistry and chemical engineering graduates, respectively.

- For chemists with bachelor's degrees in 2012 the median starting salary on the 50th percentile was $36,000 (same as in Table 1b). However, the top 10% of new graduates landed salaries 39% higher in excess of $50,000. In contrast, the bottom 10% of graduates received salaries that were at least 28% lower than the median.
- For chemistry Ph.D.'s, the top 10% received starting salaries approximately 30% higher than the median, or above $96,770. The 10% at the low end of the range received salaries at least 45% lower than the median, or below $40,500.

Table 4a. Ranges of Starting Salaries of **Inexperienced Full-Time** Employed **Chemistry** Graduates by Degree 2011 & 2012

	Bachelor's		Master's		Doctorates	
	2011	2012	2011	2012	2011	2012
90th Percentile	50,320	50,000	81,250	71,600	98,900	96,770
75th Percentile	42,500	41,680	67,636	57,525	90,000	90,225
50th Percentile	35,000	36,000	46,703	46,500	75,980	74,500
25th Percentile	30,000	31,200	38,750	40,838	50,750	53,750
10th Percentile	24,000	26,000	34,000	34,290	41,000	40,500
Mean	37,047	37,210	53,875	50,351	71,964	72,574
Count	197	211	14	30	34	30
Std. Deviation	11,222	9,171	17,469	14,487	21,317	21,232
Std. Error of Mean	800	631	4,669	2,645	3,656	3,876

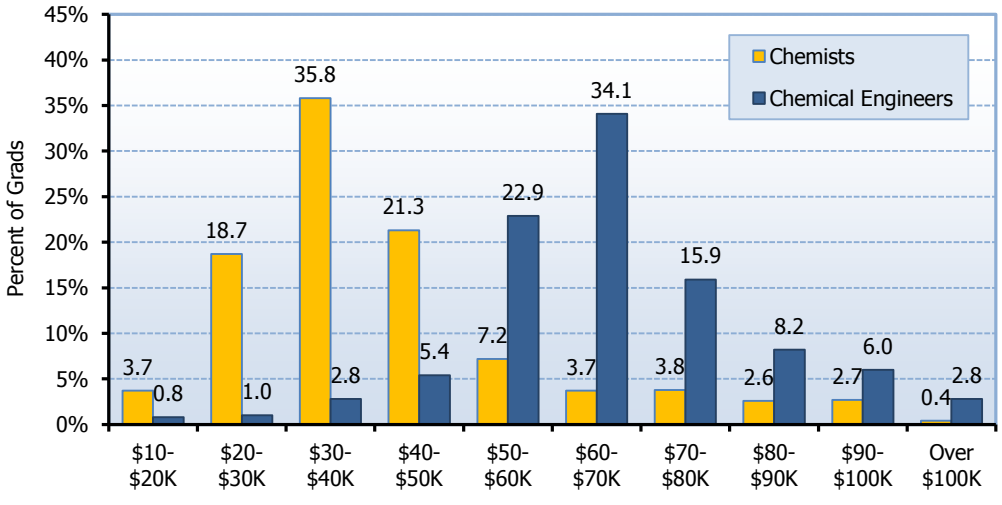
Table 4b: Chemical engineers with bachelor's degrees had a starting median of $66,750 in 2012. The top 10% of *inexperienced* grads received salaries exceeding $82,000 or 23% higher than the median. Graduates at the low end of the range received salaries at least 23% lower than the median, or below $51,250. Data are not robust enough to report for graduates with Master's degrees and Ph.Ds.

Table 4b. Range of Starting Salaries for **Inexperienced Full-Time** Employed **Chemical Engineering** Graduates with Bachelor's Degrees 2011 & 2012

	Bachelor's	
	2011	2012
90th Percentile	76,431	82,000
75th Percentile	68,050	71,000
50th Percentile	62,500	66,750
25th Percentile	55,000	60,000
10th Percentile	44,000	51,250
Mean	61,416	65,530
Count	69	64
Std. Deviation	13,351	12,206
Std. Error of Mean	1,607	1,526

Figure 2 summarizes the difference in salary ranges between chemists and chemical engineers overall – that is, recipients of all 3 degrees combined. Basically it shows that 76% of chemists receiving degrees who had less than one year of prior technical work experience in 2012 landed full-time permanent jobs that pay between $20,000 and $50,000. In contrast, 73% of chemical engineers with similar credentials except for a degree in chemical engineering got full-time jobs between $50,000 and $80,000.

Figure 2: Percent of Inexperienced New Grads in Each Starting Salary Range (2012)



SALARIES BY EMPLOYMENT SECTOR

Median Salaries by Employment Sector: Over the past five years combined (2008-2012), new grads have taken jobs in the work force in the following proportions:

Table 5a. Placement of Inexperienced New Grads (2008-2012)

Sector	Chemistry Graduates	Chemical Engineering Graduates
Industry	70%	89%
Academia	20%	6%
Government	10%	5%

The combined 2008-2012 data also show that government has been the highest payer for new *chemistry* graduates during the past 5 years, on average. In contrast, industry and academia are much more competitive in what they are willing to pay new *chemical engineering* graduates:

Table 5b. Median Salaries for Inexperienced New Grads (2008-2012)

Sector	Chemistry Graduates	Chemical Engineering Graduates
Industry	38,000	66,000
Academia	39,000	65,000
Government	42,000	55,000
Medians are based on unadjusted current dollar data as collected across the 5 year period.		

As indicated in **Table 6,** the government was the sector paying the most to attract inexperienced new graduates in 2011 – that is, chemistry and chemical engineering graduates combined. However, the table documents that government hiring underwent a -8.9% cut-back in starting wages in 2012. In contrast, academia increased its starting wage offers by a healthy +5.6% in 2012, while industry overall increased its offers to new graduates by +1.2%.

Table 6. Median Salaries for All **Inexperienced** New Grads Working **Full-Time Permanent** Jobs by Employment Sector 2011-2012

	Median Salary in Current Dollars		% Change from 2011	
	2011	2012	Current Dollars	Constant Dollars*
All Sectors	42,000	41,680	-0.8%	-3.0%
Industry	42,500	43,000	+1.2%	-1.0%
Government	45,016	41,000	-8.9%	-11.1%
Academia	37,750	39,857	+5.6%	+3.4%
* Rate of inflation = 2.2%				

EQUALITY OF THE SEXES

Women's' salaries are getting close to parity with men's salaries. **Table 7** shows that in 2012, for all 3 degrees combined, women's median starting salaries for inexperienced full-time employed *chemistry* graduates are only 5.0% lower than their male counterparts. For starting positions in *chemical engineering,* women's salaries are only 2% lower. The *sub-samples* for inexperienced chemical engineers with *master's degrees* and *Ph.D.'s* are quite small and therefore not shown.

Table 7. Median Starting Salaries for Male and Female **Full-Time Permanent Inexperienced** Chemists and Chemical Engineers by Gender in 2012

	Chemistry Graduates			Chemical Engineering Graduates		
	Men	Women	Difference	Men	Women	Difference
All Degrees	40,000	38,000	-5.0%	67,152	65,800	-2.0%
Bachelor's	38,000	35,000	-7.9%	66,950	65,000	-2.9%
Master's	45,000	48,000	+6.7%	n.a.	n.a.	n.a.
Doctorate	80,000	70,000	-12.5%	n.a.	n.a.	n.a.
Cells with fewer than 15 cases not available and indicated with "n.a."						

Figure 3a breaks out the differences between men's and women's median starting salaries for *chemists* with less than 12 months professional or technical work experience by different job types. To obtain a representative sample across a fairly large number of breaks, 2012 data is combined with 2010 and 2011 data to base the results below on a more robust sample of 431 women and 380 men.

The chart shows that inexperienced male *chemists* received higher salaries during the 2010-2012 period than did first year females. Among the 811 jobs reviewed in the table, male starting salaries averaged $40,000 and females averaged $37,400, giving males a 6.5% advantage in starting earnings.

As would have been shown in a pair of TOTAL bars for 2012 alone, and is shown in Table 7, the advantage for males in 2012 is reduced to +5.0%

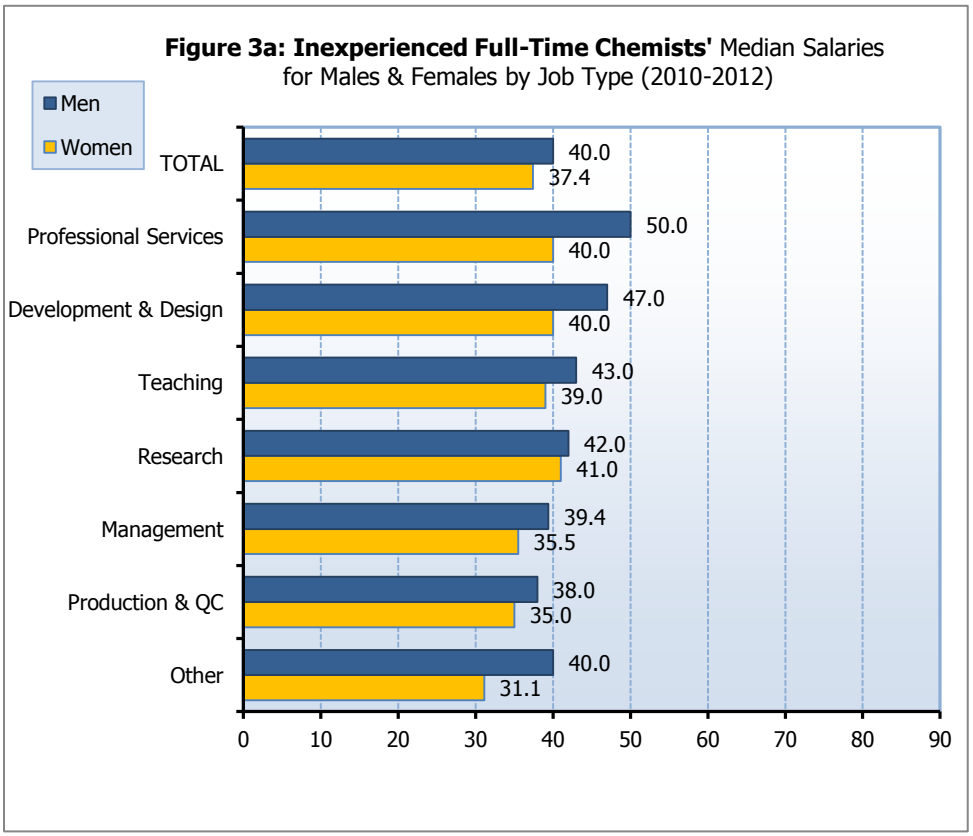
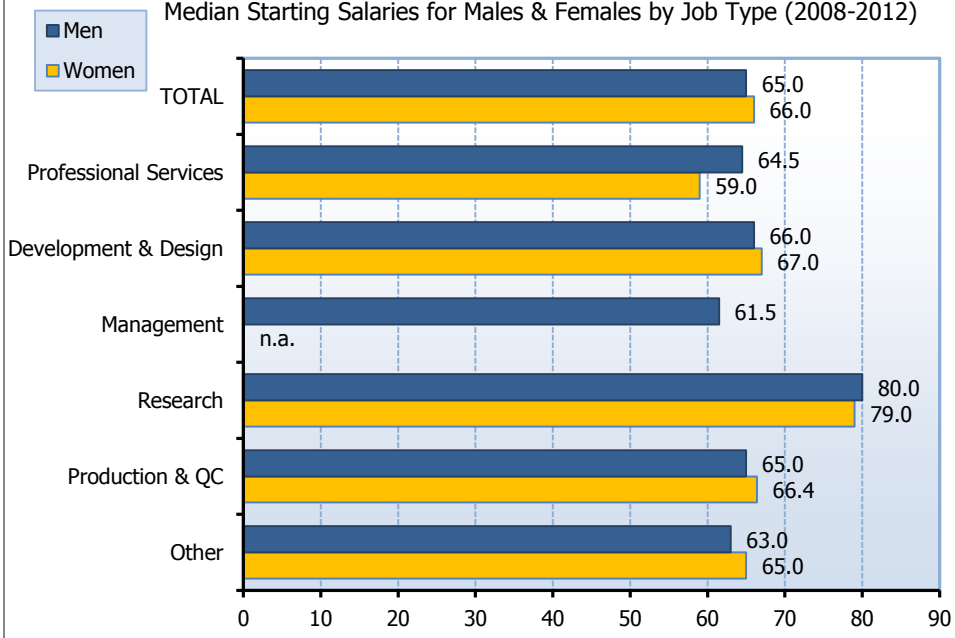


Figure 3a: Inexperienced Full-Time Chemists' Median Salaries for Males & Females by Job Type (2010-2012)

Because the 2012 sub-samples for *chemical engineers* are too small to breakout by work function and gender, the 2012 respondents were combined with samples from previous years. Going all the way back to 2008, the 5 year sample of respondents gathered for **Figure 3b** consists of 181 female and 309 male chemical engineering full-time employed new graduates. Still there are not enough *teachers* to break out in the chart, and the number of females in *management* is low to include.

Figure 3b: Inexperienced Full-Time Chemical Engineers'
Median Starting Salaries for Males & Females by Job Type (2008-2012)



Cells with fewer than 15 cases not available and indicated with "n.a."

Table 7 above, showed that the overall difference between the genders for median salaries among chemical engineers had women trailing only by -2% in 2012. Figure 3b, with combined results for five years, shows women with a slightly higher overall starting median salary of $66,000 compared with their male counterparts at $65,000, a difference of +1.5% for the women. The chart shows that jobs in *research* offered the highest starting salaries for chemical engineers, with a median of $80,000 for men and $79,000 for women. Men tended to draw higher starting salaries for *professional services,* but all the remaining work functions in the chart were relatively equal.

PLANS FOR ADVANCED STUDY

As presented in **Table 8**, approximately 41.5% of 2012 student graduates are currently pursuing advanced studies that started in the fall of 2012. Most, about 38%, are working full-time toward an advanced degree. Another 3% to 4% of new graduates have jobs and study on a part-time basis. Whereas chemistry graduates are much more likely than chemical engineering graduates to pursue an advanced degree, the split between females and males is about even in 2012.

Table 8. Advanced Studies by Degree Field and Gender (2012)

	Degree Field			Gender		
	Chem-istry (n = 1,675)	Chem. Engnr. (n = 153)	Total (n = 1,828)	Female (n = 912)	Male (n = 890)	Total (n = 1,802)
Enrolled Full-Time	40.4%	13.7%	38.2%	38.3%	38.3%	38.3%
Enrolled Part-Time	3.6%	1.3%	3.4%	2.6%	3.8%	3.2%
Not Enrolled	56.0%	85.0%	58.4%	59.1%	57.9%	58.5%

The overall trend in post-graduate education has been declining. In 1987, 60.0% of graduates continued their education after graduation. In 2012, the proportion of graduates pursuing an advanced degree either full or part-time has declined by almost 1/3 to 41.5%.

Table 9 shows the fields of advanced study that chemistry and chemical engineering B.S./B.A. and M.S. graduates have enrolled in for fall 2012. The table combines full and part-time students and breaks out the fields of study by chemistry and chemical engineering graduates who are continuing their education. Because the sample sizes are fairly thin for reliably covering the list of advanced degree fields of study, the table shows the combined results for 2008-2012 for enhanced stability. It is important to note that the 5 year results do not differ much from the 2012 solo results, indicating that the data holds together quite well on a year-over-year basis.

Among chemistry graduates pursuing advanced degrees, approximately 1/3 of them (35.6%) are pursuing a higher degree in chemistry. Another 16.4% are studying other science fields (fields 2 through 6 on the list), 35.3% are studying aspects of the medical profession (medicine, dentistry, or pharmacy), and the remaining 12.7% are mostly studying non-science oriented professions like business management, education, law or other endeavors.

Among the advanced studies chosen by chemical engineers, more than 6 in 10 (63.0%) are advancing their expertise in chemical or biochemical engineering. Choices among other degree fields are fairly wide spread.

Table 9: Fields of Advanced Study Started in Fall of the Year of Graduation by Chemistry and Chemical Engineering Graduates Across 2008-2012

	Chemistry	Chemical Engineering
	2008-2012 (n = 4,179)	2008-2012 (n = 303)
Chemistry	35.6%	6.3%
Other Physical Science/Math	3.5%	n.a.
Chem/Biochem Engineering	1.1%	63.0%
Other Engineering	1.2%	9.6%
Biochemistry	7.1%	n.a.
Life Science	3.5%	n.a.
Medicine	22.3%	8.6%
Dentistry	2.9%	n.a.
Pharmacy	10.1%	n.a.
Business Management	1.0%	n.a.
Education	3.4%	n.a.
Law	1.2%	n.a.
Other	7.1%	n.a.

Cells with fewer than 15 cases not available and indicated with "n.a."

EMPLOYMENT STATUS

EMPLOYMENT STATUS

Table 10 below brings all employment variables tracked by the new grad study together in a single summary table for all 2012 graduates:

Table 10. Summary of Employment Status for All New Grads 2012

Employment Status	Respondent Counts	Percent
Full-Time Permanent	519	26.3%
Full-Time Temporary	192	9.7%
Part-Time Permanent	41	2.1%
Part-Time Temporary	131	6.6%
Graduate Student/Postdoc	764	38.7%
Not Employed/but Seeking	249	12.6%
Not Employed/not Seeking	76	3.9%
TOTAL	1,972	100.0%

UNEMPLOYMENT

Unemployment among new graduates is 3 times as high as the rate for regular ACS members in 2012.

Figure 4: Unemployment Rate Among New Graduates Compared with ACS Members 2000-2012

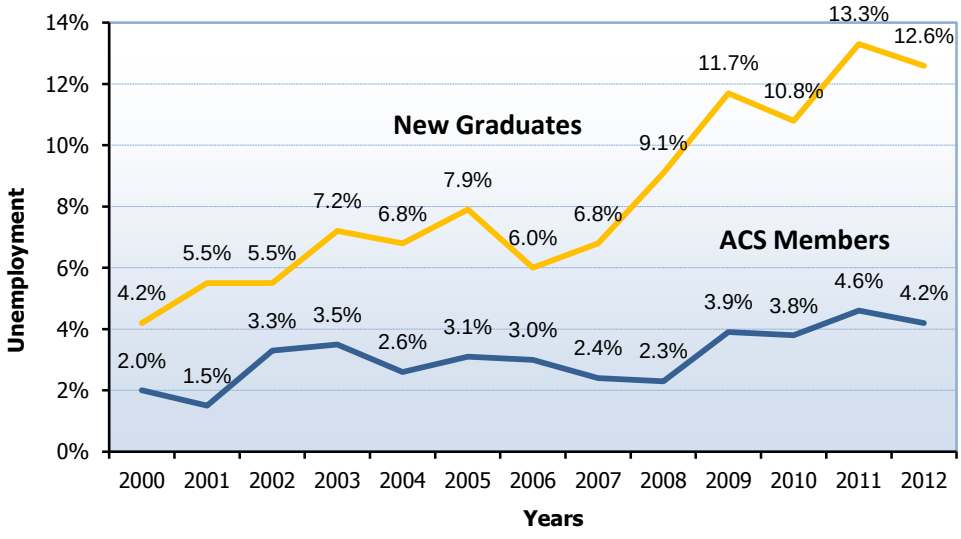
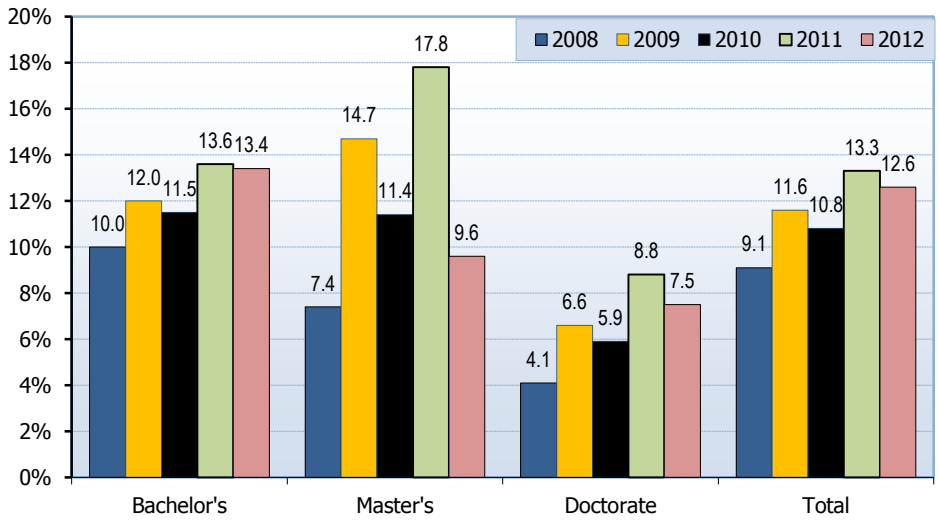


Figure 5 zeros in on the unemployment trend for new graduates over the past 5 years, comparing the rates for bachelor's, master's and doctorate degree recipients. Recently there has been evidence that the economy is improving. It is likely, therefore, that the figures for 2011 in the chart represent the peaks in unemployment among new chemistry and chemical engineering graduates. Although the reduction shown in the bars for 2012 is very modest, it is likely that the rates will continue to decline. Traditionally, unemployment in the chemistry profession tends to lag unemployment for the U.S. as a whole by about a year.

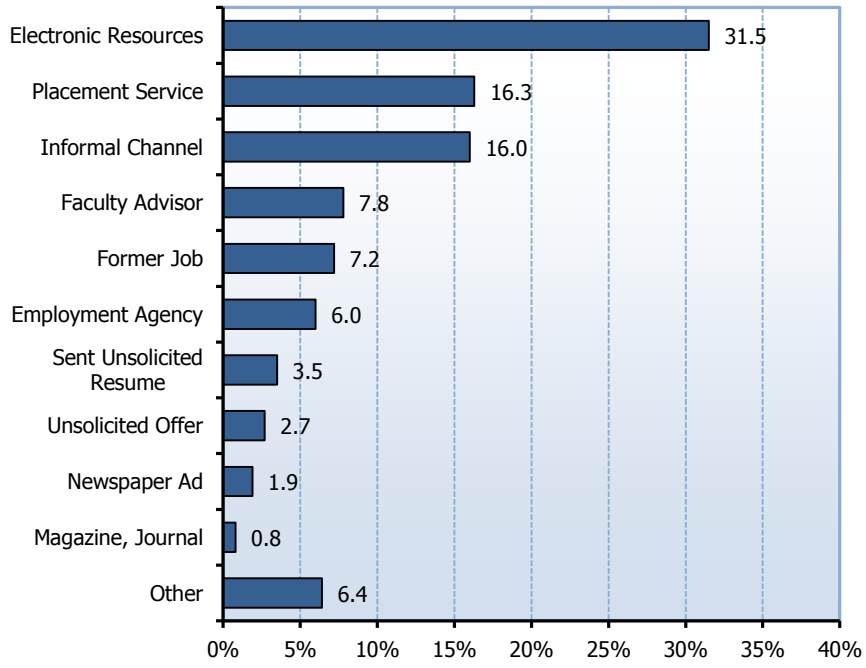
Figure 5: Unemployment Rates for All New Grads by Degree



JOB SEARCH

Graduates that found full-time permanent employment by October 1, 2012 were asked to name the "one most effective job search method" they used. The results are shown in **Figure 6.** Topping the list is *electronic resources,* which focus mainly on naming websites like craigslist.org, CareerBuilder.com, and Monster.com. The second most effective method was campus *placement services*, which were particularly cited for hosting effective job fairs and job conferences.

Figure 6: The One Most Effective Job Search Method (2012)



JOB SATISFACTION

Graduates who found full-time permanent employment were also asked a series of questions about how well their educational training prepared them for their job. Three questions were asked (4 for Ph.Ds.) using a scale of *strongly agree, agree, no opinion, disagree* and *strongly disagree.* "Strongly agree" is the most sensitive response and represents the result that university programs are trying to achieve.

Figure 7a shows the "strongly agree" results for *chemistry* graduates. The *appropriateness of training* received and job satisfaction from *handling challenges* is lower for B.S./B.A. degree holders. This may be expected as first jobs for bachelor's degree recipients tend to focus on on-the-job training and adjusting to the workplace rather than having a lot of responsibility. The opposite is true for Ph.Ds. who tend to have lots of responsibilities in their chosen profession. Nevertheless, only about half the Ph.Ds. and fewer B.S./B.A. and M.S. graduates "strongly agree" with any of the 4 questions.

Figure 7a: Chemistry Graduates Agreement or Disagreement with Statements Regarding Their Primary Employment (2012)
(% Strongly Agree on a 5-Point Scale)

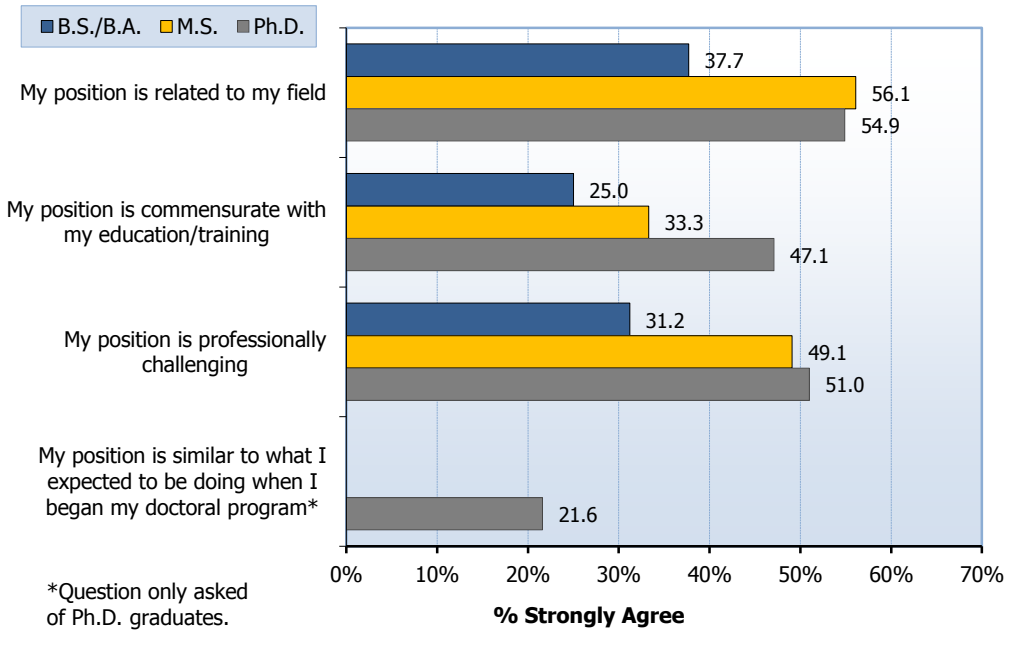
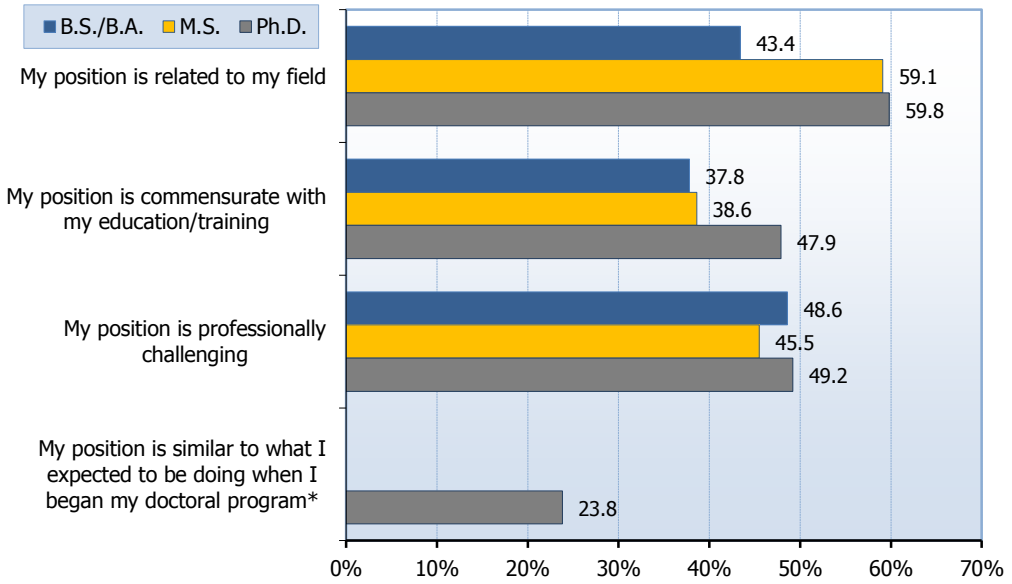


Figure 7b depicts the "strongly agree" responses to the same questions for *chemical engineering* graduates. Again, the 2008-2012 dataset is used to provide representative findings for chemical engineers with M.S. and Ph.D. degrees. These results tend to be more evenly distributed across degree levels in Figure 7b. Perhaps the training chemical engineering students receive is a better match for the types of jobs new graduates get, and maybe these jobs are more professionally challenging at the outset for graduates at the bachelor's and master's degree levels.

Figure 7b: Chemical Engineering Graduates Agreement or Disagreement with Statements Regarding Their Primary Employment (2008-2012)
(% Strongly Agree on a 5-Point Scale)



*Question only asked of Ph.D. graduates.

DEMOGRAPHICS

Table 11. 2012 New Graduate Demographics (n = 2012)

	Counts	Percents
Highest Degree		
Bachelor's	1,708	85.1%
Master's	138	6.9%
Doctorate	161	8.0%
Field of Study		
Chemistry	1,821	91.0%
Chemical Engineering	173	8.6%
Non-Chemistry	7	0.3%
Gender		
Male	981	50.1%
Female	978	49.9%
Ethnicity		
American Indian	7	0.4%
Asian	240	12.6%
Black	105	5.5%
White	1,429	74.8%
Multiracial	75	3.9%
Other	54	2.8%
Age		
21 or Under	73	3.8%
22	811	42.2%
23-24	527	27.4%
25-29	327	17.0%
30-34	117	6.1%
35-39	35	1.8%
40-49	23	1.2%
50-64	7	0.4%
65 and Over	2	0.1%

Counts may not total 2,012 because not all respondents answered

Table 11 breaks out demography for all new graduates that participated in the 2012 ACS survey. Counts and percents are broken out for all respondents by the degree they received, their field of study, as well as their gender, ethnicity and age. Of these respondents, about 85% received a bachelor's degree, 91% received a degree in chemistry, 75% were white, 87% were between the ages of 22 and 29, and representation was about equal between females and males.

Table 12 divides the respondents by the degree they received. Chemical engineers represent 12.4% of the graduates that received a Ph.D.in 2012. While this proportion is greater than the percent of chemical engineers receiving bachelors and master's degrees, it represents a decline from 19.1% of chemical engineers who received a Ph.D. in 2011.

Females and males are about even in number of graduates receiving B.S./B.A. and M.S. degrees, but males are still dominant in receiving doctorate degrees. This is changing. Back in 2008, 67% of doctorate degrees were awarded to men and only 33% were awarded to women. In 2012, the gap between men and women receiving Ph.Ds. has been reduced to 58% to 42%, respectively.

Although Asians were just 12.6% of the degree recipients in 2012, they accounted for 23% of the Ph.Ds. awarded. Asians received 30% of the Ph.Ds. in 2011. In contrast, whites account for 74.8% of the graduates in 2012, but only 64% of the Ph.Ds. awarded.

Table 12. 2012 Demographics by Degree (n = 2012)

	Bachelor's	Master's	Doctorate
Field of Study			
Chemistry	91.3%	91.3%	87.6%
Chemical Engineering	8.3%	8.0%	12.4%
Non-Chemistry	0.4%	0.7%	--
Gender			
Male	49.2%	51.1%	57.9%
Female	50.8%	48.9%	42.1%
Ethnicity			
American Indian	0.3%	1.5%	--
Asian	11.1%	17.7%	23.3%
Black	5.4%	4.6%	7.5%
White	76.1%	72.3%	64.2%
Multiracial	4.3%	1.5%	1.9%
Other	2.8%	2.3%	3.1%
Age			
21 or Under	4.5%	--	--
22	49.6%	2.3%	--
23-24	30.9%	15.8%	--
25-29	10.9%	54.1%	49.1%
30-34	2.4%	18.0%	34.0%
35-39	0.7%	3.0%	12.6%
40-49	0.8%	3.0%	3.8%
50-64	0.2%	2.3%	0.6%
65 and Over	0.1%	--	--

CITIZENSHIP

Table 13 examines how many graduates were studying chemistry and chemical engineering in the US on temporary student visas. This will help to explain the discrepancy among advanced degree recipients in the previous table. Again, because sample sizes are small and year-to-year breakouts are relatively stable, to improve its validity and reliability Table 13 is based on combined data for the past 5 years (2008-2012).

A review of Table 13 reveals that foreign students are not coming to the US to get an undergraduate degree. Over the last 5 years, only 1.3% of chemistry graduates and 1.1% of chemical engineering graduates were foreigners who came to U.S. universities on a temporary visa to get a B.S. /B.A. degree.

However, among chemistry graduates, 17.2% of M.S. degrees and 24.7% of Ph.Ds. were awarded to graduates who came to the United States on temporary visas. Similarly, for chemical engineering graduates, 37.1% of master's and 28.6% of doctor's degrees were awarded to foreign students here on temporary visas. These findings attest to the positive value placed on advanced degrees in chemistry and chemical engineering from American universities throughout the world.

Table 13. Citizenship of Chemistry and Chemical Engineering Graduates (2008-2012)

	Chemistry			Chemical Engineers		
	B.A./B.S. (n = 8,070)	M.S. (n = 664)	Ph.D. (n = 1,029)	B.A./B.S. (n = 982)	M.S. (n = 116)	Ph.D. (n = 182)
US Native	87.6%	71.7%	67.1%	90.7%	46.6%	63.7%
US Naturalized	7.7%	6.9%	3.2%	5.6%	6.0%	2.2%
US Perm. Resident	3.3%	4.2%	5.1%	2.5%	10.3%	5.5%
Temporary Visa	1.3%	17.2%	24.7%	1.1%	37.1%	28.6%

Caution: Some chemical engineering data are based on small samples and should be interpreted with care.

SCOPE AND METHOD

PURPOSE

The ACS Survey of New Graduates 2012 is part of an ongoing series of annual surveys conducted by the ACS on the employment and future plans of new chemistry and chemical engineering graduates. The primary purpose of the survey is to gather data on the starting salaries and occupational status of new chemists and chemical engineers who graduated during the 2011-2012 academic year. The survey covers bachelors, masters, and doctoral degree recipients.

SAMPLING AND DATA COLLECTION

The ACS Survey of New Graduates 2012 reflects responses from chemistry and chemical engineering college students graduating during the 2011 and 2012 academic year. Chemistry graduates were solicited

from universities containing ACS approved chemistry programs, while chemical engineering graduates were solicited from universities with ABET accredited chemical engineering programs.

Volunteers were solicited from a sample of 12,132 graduates having full U.S. mailing addresses, to complete either the paper or online version of the New Graduate Survey in 2012. The ACS Department of Member Research and Technology (DMRT) identified potential participants for this study by requesting the names and addresses of recent graduates from the Committee on Professional Training (CPT), an internal division of ACS.

Survey questionnaires were mailed by first class mail in late September 2012. A reminder postcard was mailed a week later. A second mailing was sent in early November, followed soon thereafter by a reminder postcard, and a third mailing roughly three weeks later. Of the 12,132 surveys, a total of 2,012 usable responses were received, resulting in a 16.6% response rate. Respondents could complete the survey by mail (55.4%) and via the Web (44.6%).

TECHNICAL NOTES

DISCREPANCIES AMONG TABLES

Because not all individuals responded to all of the survey items, some pairs of tables contain totals that should be identical but are not. For example, one table may group Ph.Ds. by gender and another by employer. The totals will differ unless the number who did not indicate their gender is the same as the number who did not indicate their employer.

ESTIMATES OF MEDIAN SALARIES

Some median salary data presented in salary tables are based on small samples and subject to sampling error. As a precaution, median salary results in all table cells with fewer than 15 respondents are suspect to being unreliable and are not shown in this report. Instead "n.a." has been posted to these data cells and other tabled cells with fewer than 15 respondents.

In some instances this report uses multi-year samples to improve the validity and reliability of the sample data being reported. Nevertheless, caution should be used in interpreting results of any findings based on small samples.